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Terms: **patno=6180991** ([Edit Search](#))

426235 (08) 6180991 January 30, 2001

UNITED STATES PATENT AND TRADEMARK OFFICE GRANTED PATENT  
**6180991**

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January 30, 2001

Semiconductor having low concentration of phosphorous

**REISSUE:** January 16, 2002 - Reissue Application filed Ex. Gp.: 2822; Re. S.N. 10/045,902  
(O.G. May 7, 2002)

**INVENTOR:** Yamazaki, Shunpei - Tokyo, Japan (JP)

**APPL-NO:** 426235 (08)

**FILED-DATE:** April 21, 1995

**GRANTED-DATE:** January 30, 2001

**PRIORITY:** December 23, 1982 - 57-228158, Japan (JP)

**ASSIGNEE-AT-ISSUE:** Semiconductor Energy Laboratory Co., Ltd., Kanagawa- ken, Japan  
(JP), 03

**LEGAL-REP:** Robinson, Eric J.; Nixon Peabody LLP

**PUB-TYPE:** January 30, 2001 - Utility Patent having a previously published pre-grant  
publication (B2)

**PUB-COUNTRY:** United States (US)

**REL-DATA:**

Continuation of Ser. No. 07/748421, August 22, 1991, ABANDONED

Continuation of Ser. No. 06/785586, October 8, 1985, ABANDONED

Continuation-in-part of Ser. No. 06/525459, August 22, 1983, GRANTED PATENT 4591892,  
Utility Patent having no previously published pre-grant publication (A)


**US-MAIN-CL:** 257#458


**US-ADDL-CL:** 257#56

**CL:** 257


**SEARCH-FLD:** 257#56, 257#458

**IPC-MAIN-CL:** 7H 01L029#78

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patno=6180991

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Query/Command : file pluspat

Selected file: PLUSPAT

Search statement 1

Query/Command : us6180991/pn

\*\* SS 1: Results 1

Search statement 2

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1 / 1 PLUSPAT - @QUESTEL-ORBIT  
PN - US6180991 B1 20010130 [US6180991]  
TI - (B1) Semiconductor having low concentration of phosphorous  
PA - (B1) SEMICONDUCTOR ENERGY LAB (US)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa-ken [JP]  
IN - (B1) YAMAZAKI SHUNPEI (JP)  
AP - US42623595 19950421 [1995US-0426235]  
FD - Divsn of US350169 19941130 [1994US-0350169] (Abandoned)  
Cont. of US748421 19910822 [1991US-0748421] (Abandoned)  
Divsn of US443015 19891129 [1989US-0443015]  
Cont. of US785586 19851008 [1985US-0785586] (Abandoned)  
Divsn of US564213 19831222 [1983US-0564213]  
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Division of: US4581476  
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PR - US42623595 19950421 [1995US-0426235]  
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US35016994 19941130 [1994US-0350169]  
US74842191 19910822 [1991US-0748421]  
US44301589 19891129 [1989US-0443015]  
US78558685 19851008 [1985US-0785586]  
US56421383 19831222 [1983US-0564213]  
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EC - H01L-031/028B  
H01L-031/0288  
H01L-031/0392B  
H01L-031/075C  
PCL - ORIGINAL (O) : 257458000; CROSS-REFERENCE (X) : 257056000  
DT - Basic  
CT - US2882243; US2971607; US3155621; US3462422; US3492175; US3785122;  
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US4460670; US4471042; US4485146; US4490208; US4520380; US4549889;  
US4581476; US4591892; US4681984; US4710786; US4742012; US4758527;  
US4766477; US4843451; US4878097; US4888305; US4889782; US4889783;  
US5043772; US5077223; US5315132; US5349204; US5391893; US5521400;  
US5543636; EP0180781; GB2130008; JP51-1389; JP54-136274;  
JP54-158190; JP55-11329; JP55-13939; JP55-29154; JP53-152887;  
JP55-78524; JP56-135968; JP57-40940; JP57-146561; JP57-146562;

JP57-182546; JP57-187972; JP58-28873; JP58-92218; JP58-92217;  
JP58-155774; JP59-35488; JP59-35423; JP59-115574; JP57-228158;  
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- STG - (B1) U.S. Patent (no pre-grant pub.) after Jan. 2, 2001
- AB - A non-single-crystalline semiconductor material and a device utilizing the material, the material being of an intrinsic or substantially intrinsic conductivity type and including silicon and containing a dangling bond neutralizer consisting of hydrogen and/or a halogen wherein the concentration of carbon contained in the semiconductor material is less than  $4 \times 10^{18}$  and the concentration of boron contained in the semiconductor material is not higher than  $2 \times 10^{17}$  atoms/cm<sup>3</sup>.
- UP - 2001-13

1 / 1 LGST - @LEGSTAT  
PN - US 6180991 [US6180991]  
AP - US 426235/95 19950421 [1995US-0426235]  
DT - US-P  
ACT - 19950421 US/AE-A  
APPLICATION DATA (PATENT)  
US 426235/95 19950421 [1995US-0426235]  
  
20010130 US/BA  
PATENT (NO PREVIOUS PRE-GRANT PUBLICATION)  
  
20020507 US/RF  
REISSUE APPLICATION FILED  
20020116  
UP - 2002-20

1 / 1 CRXX - @CLAIMS/RRX  
AN - 3454118  
PN - 6,180,991 D 20010130 [US6180991]  
PA - Semiconductor Energy Laboratory Co Ltd JP  
PT - E (Electrical)  
ACT - 20020116 REISSUE REQUESTED  
ISSUE DATE OF O.G.: 20020507  
REISSUE REQUEST NUMBER: 10/045902  
EXAMINATION GROUP RESPONSIBLE FOR REISSUEPROCESS: 2822

Reissue Patent Number:

UP - 2002-19  
UACT- 2002-05-07

Query/Command : fam us6180991/pn

1 Patent Groups  
\*\* SS 2: Results 24

Search statement 3

Query/Command : famstate nonstop

1 / 24 PLUSPAT - @QUESTEL-ORBIT  
PN - AU1832783 A 19840301 [AU8318327]  
STG - (A) Open to public inspection  
TI - (A) PHOTOELECTIC CONVERSION DEVICE  
PA - (A) SEMICONDUCTOR ENERGY LAB  
IN - (A) YAMAZAKI SHUNPEI  
IC - (A) H01L-031/02 H01L-031/06  
PN2 - AU568504 B2 19880107 [AU-568504]  
STG2- (B2) Patent preceeded by A1  
TI2 - (B2) PHOTOELECTIC CONVERSION DEVICE  
PA2 - (B2) SEMICONDUCTOR ENERGY LAB  
IN2 - (B2) YAMAZAKI SHUNPEI  
IC2 - (B2) H01L-031/02 H01L-031/06

AP - AU1832783 19830823 [1983AU-0018327]  
PR - JP14656182 19820824 [1982JP-0146561]  
JP18254682 19821018 [1982JP-0182546]

2 / 24 PLUSPAT - @QUESTEL-ORBIT

PN - GB8322583 D0 19830928 [GB8322583]  
STG - (D0) Application for patent  
TI - (D0) SEMICONDUCTOR PHOTO-ELECTRIC CONVERSION DEVICE  
PA - (D0) SEMICONDUCTOR ENERGY LAB  
IN - (A) YAMAZAKI SHUNPEI  
IC - (D0) H01L-031/02  
PN2 - GB2130008 A 19840523 [GB2130008]  
STG2 - (A) Application published  
TI2 - (A) SEMICONDUCTOR PHOTOELECTRIC CONVERSION DEVICE  
PA2 - (A) SEMICONDUCTOR ENERGY LAB  
IN2 - (A) YAMAZAKI SHUNPEI  
IC2 - (A) H01L-031/04  
PN3 - GB2130008 B 19850925 [GB2130008]  
STG3 - (B) Patent granted  
TI3 - (B) SEMICONDUCTOR PHOTOELECTRIC CONVERSION DEVICE  
PA3 - (B) SEMICONDUCTOR ENERGY LAB  
IN3 - (B) YAMAZAKI SHUNPEI  
IC3 - (B) H01L-031/04  
AP - GB8322583 19830823 [1983GB-0022583]  
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EC - H01L-031/0376B  
H01L-031/075  
DT - Basic

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PN - GB 2130008 [GB2130008]  
AP - GB 8322583/83 19830823 [1983GB-0022583]  
DT - GB-P  
ACTE - 19830823 GB/AE-A  
APPLICATION DATA  
GB 8322583/83 19830823 [1983GB-0022583]

19840523 GB/A1  
APPLICATION PUBLISHED

19850925 GB/PG [+]  
PATENT GRANTED

UP - 1989-42

3 / 24 PLUSPAT - @QUESTEL-ORBIT - image

PN - JP59035488 A 19840227 [JP59035488]  
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TI - (A) SEMICONDUCTOR DEVICE  
PA - (A) HANDOTAI ENERGY KENKYUSHO  
PA0 - SEMICONDUCTOR ENERGY LAB CO LTD  
IN - (A) YAMAZAKI SHIYUNPEI  
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AP - JP14656182 19820824 [1982JP-0146561]  
PR - JP14656182 19820824 [1982JP-0146561]  
EC - H01L-031/0376B  
H01L-031/075

DT - Corresponding document

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PR - JP18254682 19821018 [1982JP-0182546]  
EC - H01L-031/0376B  
H01L-031/075  
DT - Corresponding document

5 / 24 PLUSPAT - @QUESTEL-ORBIT - image  
PN - JP59115574 A 19840704 [JP59115574]  
STG - (A) Doc. Laid open to publ. Inspec.  
TI - (A) MANUFACTURE OF PHOTOELECTRIC CONVERTER  
PA - (A) HANDOTAI ENERGY KENKYUSHO  
PAO - (A) SEMICONDUCTOR ENERGY LAB CO LTD  
IN - (A) YAMAZAKI SHIYUNPEI  
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AP - JP22815882 19821223 [1982JP-0228158]  
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EC - H01L-031/028B  
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DT - Corresponding document

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IN - (A) YAMAZAKI SHUNPEI  
IC - (A) H01L-021/205 H01L-029/14 H01L-031/04  
AP - JP9639185 19850507 [1985JP-0096391]  
PR - JP9639185 19850507 [1985JP-0096391]  
EC - H01L-031/075  
H01L-031/20B2  
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7 / 24 PLUSPAT - @QUESTEL-ORBIT - image  
PN - JP61255016 A 19861112 [JP61255016]  
STG - (A) Doc. Laid open to publ. Inspec.  
TI - (A) SEMICONDUCTOR DEVICE MANUFACTURING METHOD  
PA - (A) SEMICONDUCTOR ENERGY LAB  
PAO - (A) SEMICONDUCTOR ENERGY LAB CO LTD  
IN - (A) YAMAZAKI SHUNPEI  
IC - (A) H01L-021/205  
PN2 - JP2590305 B2 19970312 [JP2590305]

STG2- (B2) Grant. Pat. With A from 2500000 on  
IC2 - (B2) H01L-031/04  
AP - JP9639285 19850507 [1985JP-0096392]  
PR - JP9639285 19850507 [1985JP-0096392]  
EC - H01L-021/205  
DT - Basic

8 / 24 PLUSPAT - @QUESTEL-ORBIT - image  
PN - US5349204 A 19940920 [US5349204]  
STG - (A) United States patent  
TI - (A) Photoelectric conversion device  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory, Company, Ltd., Tokyo [JP]  
IN - (A) YAMAZAKI SHUNPEI (JP)  
IC - (A) H01L-027/14 H01L-031/00  
AP - US16237493 19931207 [1993US-0162374]  
PR - US16237493 19931207 [1993US-0162374]  
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US44301589 19891129 [1989US-0443015]  
US56421383 19831222 [1983US-0564213]  
US74842191 19910822 [1991US-0748421]  
US78558685 19851008 [1985US-0785586]  
US80473691 19911203 [1991US-0804736]  
EC - H01L-031/028B  
H01L-031/0288  
H01L-031/0392B  
H01L-031/075  
PCL - ORIGINAL (O) : 257053000; CROSS-REFERENCE (X) : 136258000  
257E31014 257E31042 257055000 257056000 257458000  
DT - Corresponding document

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PN - US 5349204 [US5349204]  
AP - US 162374/93 19931207 [1993US-0162374]  
DT - US-P  
ACTE- 19931207 US/AE-A  
APPLICATION DATA (PATENT)  
US 162374/93 19931207 [1993US-0162374]  
  
19940920 US/A  
PATENT  
  
19970128 US/CC  
CERTIFICATE OF CORRECTION  
UP - 2002-10

9 / 24 PLUSPAT - @QUESTEL-ORBIT - image  
PN - US5468653 A 19951121 [US5468653]  
STG - (A) United States patent  
TI - (A) Photoelectric conversion device and method of making the same  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa [JP]  
IN - (A) YAMAZAKI SHUNPEI (JP)  
IC - (A) H01L-021/20  
AP - US16553693 19931213 [1993US-0165536]  
PR - US16553693 19931213 [1993US-0165536]  
JP22815882 19821223 [1982JP-0228158]

JP14656182 19820824 [1982JP-0146561]  
JP18254682 19821018 [1982JP-0182546]  
US74842191 19910822 [1991US-0748421]  
US44301589 19891129 [1989US-0443015]  
US78558685 19851008 [1985US-0785586]  
US56421383 19831222 [1983US-0564213]  
US52545983 19830822 [1983US-0525459]  
EC - H01L-031/028B  
H01L-031/0288  
H01L-031/0376B  
H01L-031/0392B  
H01L-031/075  
PCL - ORIGINAL (O) : 438087000; CROSS-REFERENCE (X) : 257E31014  
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DT - Corresponding document

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PN - US 5468653 [US5468653]  
AP - US 165536/93 19931213 [1993US-0165536]  
DT - US-P  
ACTE- 19931213 US/AE-A  
APPLICATION DATA (PATENT)  
US 165536/93 19931213 [1993US-0165536]  
  
19951121 US/A  
PATENT  
UP - 2002-10

10 / 24 PLUSPAT - @QUESTEL-ORBIT - image  
PN - "order18481700011" style="position:relative;">US5521400 A 19960528  
[US5521400]  
STG - (A) United States patent  
TI - (A) Semiconductor photoelectrically sensitive device with low  
sodium concentration  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa-ken [JP]  
IN - (A) YAMAZAKI SHUNPEI (JP)  
IC - (A) H01L-029/04 H01L-031/036 H01L-031/0376 H01L-031/20  
AP - US35011594 19941129 [1994US-0350115]  
PR - JP9639185 19850507 [1985JP-0096391]  
JP9639285 19850507 [1985JP-0096392]  
JP14656182 19820824 [1982JP-0146561]  
JP18254682 19821018 [1982JP-0182546]  
US35011594 19941129 [1994US-0350115]  
US69440691 19910501 [1991US-0694406]  
US80069485 19851122 [1985US-0800694]  
US86044186 19860507 [1986US-0860441]  
EC - H01L-021/205  
H01L-031/0376B  
H01L-031/075  
H01L-031/105B  
H01L-031/20B  
H01L-031/20B2  
PCL - ORIGINAL (O) : 257052000; CROSS-REFERENCE (X) : 136258000  
257E21101 257E31048 257E31062 257054000 257055000 257056000  
257058000  
DT - Corresponding document

1 / 1 LEGALI - @LEGSTAT  
PN - US 5521400 [US5521400]  
AP - US 350115/94 19941129 [1994US-0350115]  
DT - US-P  
ACTE- 19941129 US/AE-A  
APPLICATION DATA (PATENT)  
US 350115/94 19941129 [1994US-0350115]  
  
19960528 US/A  
PATENT  
  
19980407 US/CC  
CERTIFICATE OF CORRECTION  
UP - 1998-20

11 / 24 PLUSPAT - @QUESTEL-ORBIT  
PN - US6180991 B1 20010130 [US6180991]  
STG - (B1) U.S. Patent (no pre-grant pub.) after Jan. 2, 2001  
TI - (B1) Semiconductor having low concentration of phosphorous  
PA - (B1) SEMICONDUCTOR ENERGY LAB (US)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa-ken [JP]  
IN - (B1) YAMAZAKI SHUNPEI (JP)  
IC - (B1) H01L-029/78 H01L-033/00  
AP - US42623595 19950421 [1995US-0426235]  
PR - US42623595 19950421 [1995US-0426235]  
JP22815882 19821223 [1982JP-0228158]  
US35016994 19941130 [1994US-0350169]  
US74842191 19910822 [1991US-0748421]  
US44301589 19891129 [1989US-0443015]  
US78558685 19851008 [1985US-0785586]  
US56421383 19831222 [1983US-0564213]  
US52545983 19830822 [1983US-0525459]  
EC - H01L-031/028B  
H01L-031/0288  
H01L-031/0392B  
H01L-031/075C  
PCL - ORIGINAL (O) : 257458000; CROSS-REFERENCE (X) : 257056000  
DT - Basic  
UP - 2001-13

1 / 1 LEGALI - @LEGSTAT  
PN - US 6180991 [US6180991]  
AP - US 426235/95 19950421 [1995US-0426235]  
DT - US-P  
ACTE- 19950421 US/AE-A  
APPLICATION DATA (PATENT)  
US 426235/95 19950421 [1995US-0426235]  
  
20010130 US/BA  
PATENT (NO PREVIOUS PRE-GRANT PUBLICATION)  
  
20020507 US/RF  
REISSUE APPLICATION FILED  
20020116  
UP - 2002-20

12 / 24 PLUSPAT - @QUESTEL-ORBIT - image  
PN - US6503771 B1 20030107 [US6503771]  
STG - (B1) U.S. Patent (no pre-grant pub.) after Jan. 2, 2001  
TI - (B1) Semiconductor photoelectrically sensitive device  
PA - (B1) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa-ken [JP]  
IN - (B1) YAMAZAKI SHUNPEI (JP)  
IC - (B1) H01L-021/00 H01L-021/84 H01L-029/04  
AP - US42672899 19991026 [1999US-0426728]  
PR - US42672899 19991026 [1999US-0426728]  
JP9639185 19850507 [1985JP-0096391]  
JP9639285 19850507 [1985JP-0096392]  
US93802097 19970912 [1997US-0938020]  
US63438496 19960418 [1996US-0634384]  
US43837495 19950510 [1995US-0438374]  
US35011594 19941129 [1994US-0350115]  
US69440691 19910501 [1991US-0694406]  
US86044186 19860507 [1986US-0860441]  
US80069485 19851122 [1985US-0800694]  
US52545983 19830822 [1983US-0525459]  
EC - H01L-021/205  
H01L-031/028B  
H01L-031/0288  
H01L-031/0376B  
H01L-031/0392B  
H01L-031/075  
H01L-031/075C  
H01L-031/105B  
H01L-031/20B  
H01L-031/20B2  
PCL - ORIGINAL (O) : 438030000; CROSS-REFERENCE (X) : 257052000  
257054000 257055000 257056000 257058000 438156000 438160000  
438162000  
DT - Corresponding document  
UP - 2003-04

1 / 1 LEGALI - @LEGSTAT  
PN - US 6503771 [US6503771]  
AP - US 426728/99 19991026 [1999US-0426728]  
DT - US-P  
ACTE- 19991026 US/AE-A  
APPLICATION DATA (PATENT)  
US 426728/99 19991026 [1999US-0426728]  
20030107 US/BA  
PATENT (NO PREVIOUS PRE-GRANT PUBLICATION)  
UP - 2003-05

13 / 24 PLUSPAT - @QUESTEL-ORBIT  
PN - US5556794 A 19960917 [US5556794]  
STG - (A) United States patent  
TI - (A) Method of manufacturing a semiconductor device having low  
sodium concentration  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa-ken [JP]  
IN - (A) YAMAZAKI SHUNPEI (JP)  
IC - (A) H01L-021/306 H01L-031/20  
AP - US43837495 19950510 [1995US-0438374]  
PR - JP9639185 19850507 [1985JP-0096391]

JP9639285 19850507 [1985JP-0096392]  
US35011594 19941129 [1994US-0350115]  
US43837495 19950510 [1995US-0438374]  
US69440691 19910501 [1991US-0694406]  
US86044186 19860507 [1986US-0860441]  
EC - H01L-021/205  
H01L-031/0376B  
H01L-031/075  
H01L-031/105B  
H01L-031/20B  
H01L-031/20B2  
PCL - ORIGINAL (O) : 438482000; CROSS-REFERENCE (X) : 134001100  
136258000 257E21101 257E31048 257E31062 427534000 438096000  
438151000 438905000  
DT - Corresponding document

1 / 1 LEGALI - ©LEGSTAT  
PN - US 5556794 [US5556794]  
AP - US 438374/95 19950510 [1995US-0438374]  
DT - US-P  
ACTE- 19950510 US/AE-A  
APPLICATION DATA (PATENT)  
US 438374/95 19950510 [1995US-0438374]

19960917 US/A  
PATENT

19980310 US/CC  
CERTIFICATE OF CORRECTION

UP - 1998-18

14 / 24 PLUSPAT - ©QUESTEL-ORBIT  
PN - US5077223 A 19911231 [US5077223]  
STG - (A) United States patent  
TI - (A) PHOTOELECTRIC CONVERSION DEVICE AND METHOD OF MAKING THE SAME  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa [JP]  
IN - (A) YAMAZAKI SHUNPEI (JP)  
IC - (A) H01L-021/205  
AP - US44301589 19891129 [1989US-0443015]  
PR - JP22815882 19821223 [1982JP-0228158]  
EC - H01L-031/028B  
H01L-031/0288  
H01L-031/0392B  
H01L-031/075  
PCL - ORIGINAL (O) : 438087000; CROSS-REFERENCE (X) : 136255000  
136258000 257E31014 257E31042 438096000 438931000  
DT - Corresponding document

1 / 1 LEGALI - ©LEGSTAT  
PN - US 5077223 [US5077223]  
AP - US 443015/89 19891129 [1989US-0443015]  
DT - US-P  
ACTE- 19891129 US/AE-A  
APPLICATION DATA (PATENT)  
US 443015/89 19891129 [1989US-0443015]

19911231 US/A  
PATENT

19950523 US/RF  
REISSUE APPLICATION FILED  
950322

20010724 US/RF  
REISSUE APPLICATION FILED  
19971008

UP - 2001-32

15 / 24 PLUSPAT - ©QUESTEL-ORBIT

PN - US4758527 A 19880719 [US4758527]  
STG - (A) United States patent  
TI - (A) Method of making semiconductor photo-electrically-sensitive device  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa [JP]  
IN - (A) YAMAZAKI SHUNPEI (JP)  
IC - (A) H01L-031/18  
AP - US4793387 19870505 [1987US-0047933]  
PR - JP14656182 19820824 [1982JP-0146561]  
JP18254682 19821018 [1982JP-0182546]  
EC - H01L-031/0376B  
H01L-031/075  
PCL - ORIGINAL (O) : 438096000; CROSS-REFERENCE (X) : 136258000  
257E31048 257053000 427074000 438097000  
DT - Corresponding document

1 / 1 LEGALI - ©LEGSTAT

PN - US 4758527 [US4758527]  
AP - US 47933/87 19870505 [1987US-0047933]  
DT - US-P  
ACTE- 19870505 US/AE-A  
APPLICATION DATA (PATENT)  
US 47933/87 19870505 [1987US-0047933]

19880719 US/A  
PATENT

UP - 1989-42

16 / 24 PLUSPAT - ©QUESTEL-ORBIT - image

PN - US4591892 A 19860527 [US4591892]  
STG - (A) United States patent  
TI - (A) Semiconductor photoelectric conversion device  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Tokyo [JP]  
IN - (A) YAMAZAKI SHUMPEI (JP)  
IC - (A) H01L-027/14 H01L-031/00  
AP - US52545983 19830822 [1983US-0525459]  
PR - JP14656182 19820824 [1982JP-0146561]  
JP18254682 19821018 [1982JP-0182546]  
EC - H01L-031/0376B  
H01L-031/075  
PCL - ORIGINAL (O) : 257458000; CROSS-REFERENCE (X) : 136258000  
257E31048 257049000

DT - Corresponding document

1 / 1 LEGALI - ©LEGSTAT  
PN - US 4591892 [US4591892]  
AP - US 525459/83 19830822 [1983US-0525459]  
DT - US-P  
ACTE- 19830822 US/AE-A  
APPLICATION DATA (PATENT)  
US 525459/83 19830822 [1983US-0525459]  
  
19830822 US/AS02  
ASSIGNMENT OF ASSIGNOR'S INTEREST  
SEMICONDUCTOR ENERGY LABORATORY CO., LTD. 21-21 KITAKARASUYAMA  
7-CHOME, SETAGAYA \* YAMAZAKI, SHUMPEI : 19830819  
  
19860527 US/A  
PATENT  
UP - 1998-48

17 / 24 PLUSPAT - ©QUESTEL-ORBIT - image  
PN - US4581476 A 19860408 [US4581476]  
STG - (A) United States patent  
TI - (A) Photoelectric conversion device  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Tokyo [JP]  
IN - (A) YAMAZAKI SHUNPEI (JP)  
IC - (A) H01L-031/06  
AP - US56421383 19831222 [1983US-0564213]  
PR - JP22815882 19821223 [1982JP-0228158]  
EC - H01L-031/028B  
H01L-031/0288  
H01L-031/0392B  
H01L-031/075  
PCL - ORIGINAL (O) : 136258000; CROSS-REFERENCE (X) : 136255000  
257E31014 257E31042 257053000  
DT - Basic

1 / 1 LEGALI - ©LEGSTAT  
PN - US 4581476 [US4581476]  
AP - US 564213/83 19831222 [1983US-0564213]  
DT - US-P  
ACTE- 19831222 US/AE-A  
APPLICATION DATA (PATENT)  
US 564213/83 19831222 [1983US-0564213]  
  
19831222 US/AS02  
ASSIGNMENT OF ASSIGNOR'S INTEREST  
SEMICONDUCTOR ENERGY LABORATORY CO., LTD., 21-21 KITAKARASUYAMA  
7-CHOME, SETAGAY \* YAMAZAKI, SHUNPEI : 19831219  
  
19860408 US/A  
PATENT  
  
19950620 US/RF  
REISSUE APPLICATION FILED  
950322

19980317 US/RF  
REISSUE APPLICATION FILED  
971008  
UP - 1998-48

18 / 24 PLUSPAT - @QUESTEL-ORBIT - image  
PN - US5391893 A 19950221 [US5391893]  
STG - (A) United States patent  
TI - (A) Nonsingle crystal semiconductor and a semiconductor device  
using such semiconductor  
PA - (A) SEMICODUCTOR ENERGY LAB CO LTD (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa [JP]  
IN - (A) YAMAZAKI SHUNPEI (JP)  
IC - (A) H01L-029/04 H01L-029/78  
AP - US69440691 19910501 [1991US-0694406]  
PR - JP9639185 19850507 [1985JP-0096391]  
JP9639285 19850507 [1985JP-0096392]  
US69440691 19910501 [1991US-0694406]  
US80069485 19851122 [1985US-0800694]  
US86044186 19860507 [1986US-0860441]  
EC - H01L-021/205  
H01L-031/075  
H01L-031/105B  
H01L-031/20B  
H01L-031/20B2  
PCL - ORIGINAL (O) : 257052000; CROSS-REFERENCE (X) : 136258000  
257E21101 257E31062 257057000 257065000 257066000  
DT - Basic

1 / 1 LEGALI - @LEGSTAT  
PN - US 5391893 [US5391893]  
AP - US 694406/91 19910501 [1991US-0694406]  
DT - US-P  
ACTE- 19910501 US/AE-A  
APPLICATION DATA (PATENT)  
US 694406/91 19910501 [1991US-0694406]  
  
19910501 US/AS02  
ASSIGNMENT OF ASSIGNOR'S INTEREST  
SEMICONDUCTOR ENERGY LABORATORY CO., LTD. 398 HASE ATSUGI-SHI  
KANAGAWA-KEN 243, \* YAMAZAKI, SHUNPEI : 19910425  
  
19950221 US/A  
PATENT  
  
19980303 US/CC  
CERTIFICATE OF CORRECTION  
UP - 1999-10

19 / 24 PLUSPAT - @QUESTEL-ORBIT  
PN - US4690717 A 19870901 [US4690717]  
STG - (A) United States patent  
TI - (A) Method of making semiconductor device  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., [JP]  
IN - (A) YAMAZAKI SHUMPEI (JP)  
IC - (A) H01L-021/205

AP - US80069485 19851122 [1985US-0800694]  
PR - JP14656182 19820824 [1982JP-0146561]  
JP18254682 19821018 [1982JP-0182546]  
EC - H01L-031/0376B  
H01L-031/075  
PCL - ORIGINAL (O) : 438096000; CROSS-REFERENCE (X) : 257E31048  
427074000 438097000 438925000  
DT - Corresponding document

1 / 1 LEGALI - ©LEGSTAT  
PN - US 4690717 [US4690717]  
AP - US 800694/85 19851122 [1985US-0800694]  
DT - US-P  
ACTE- 19851122 US/AE-A  
APPLICATION DATA (PATENT)  
US 800694/85 19851122 [1985US-0800694]  
  
19870901 US/A  
PATENT  
UP - 1989-42

20 / 24 PLUSPAT - ©QUESTEL-ORBIT - image  
PN - US5043772 A 19910827 [US5043772]  
STG - (A) United States patent  
TI - (A) Semiconductor photo-electrically-sensitive device  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa [JP]  
IN - (A) YAMAZAKI SHUNPEI (JP)  
IC - (A) H01L-027/12 H01L-045/00  
AP - US86044186 19860507 [1986US-0860441]  
PR - JP9639185 19850507 [1985JP-0096391]  
JP9639285 19850507 [1985JP-0096392]  
EC - H01L-021/205  
H01L-031/0376B  
H01L-031/075  
H01L-031/105B  
H01L-031/20B  
PCL - ORIGINAL (O) : 257053000; CROSS-REFERENCE (X) : 136258000  
257E21101 257E31048 257E31062 257055000 257056000  
DT - Basic (replaces original non EP official language basic.)

1 / 1 LEGALI - ©LEGSTAT  
PN - US 5043772 [US5043772]  
AP - US 860441/86 19860507 [1986US-0860441]  
DT - US-P  
ACTE- 19860507 US/AE-A  
APPLICATION DATA (PATENT)  
US 860441/86 19860507 [1986US-0860441]  
  
19910306 US/AS02  
ASSIGNMENT OF ASSIGNOR'S INTEREST  
SEMICONDUCTOR ENERGY LABORATORY CO., LTD., 398, HASE, ATSUGI-SHI,  
KANAGAWA JAPAN \* YAMAZAKI, SHUNPEI : 19910225  
  
19910827 US/A  
PATENT

19980317 US/CC  
CERTIFICATE OF CORRECTION  
UP - 1999-10

21 / 24 PLUSPAT - @QUESTEL-ORBIT - image  
PN - US6028264 A 20000222 [US6028264]  
STG - (A) United States patent  
TI - (A) Semiconductor having low concentration of carbon  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kangawa-ken [JP]  
IN - (A) YAMAZAKI SHUNPEI (JP)  
IC - (A) H01L-031/0376 H01L-031/075  
AP - US91046597 19970725 [1997US-0910465]  
PR - US91046597 19970725 [1997US-0910465]  
JP14656182 19820824 [1982JP-0146561]  
JP18254682 19821018 [1982JP-0182546]  
JP22815882 19821223 [1982JP-0228158]  
US59723796 19960111 [1996US-0597237]  
US35016994 19941130 [1994US-0350169]  
US16553693 19931213 [1993US-0165536]  
US74842191 19910822 [1991US-0748421]  
US44301589 19891129 [1989US-0443015]  
US78558685 19851008 [1985US-0785586]  
US56421383 19831222 [1983US-0564213]  
US52545983 19830822 [1983US-0525459]  
EC - H01L-031/028B  
H01L-031/0288  
H01L-031/0376B  
H01L-031/0392B  
H01L-031/075  
PCL - ORIGINAL (O) : 136258000; CROSS-REFERENCE (X) : 252062300E  
252062300R 252501100 257E31014 257E31042 257E31048 257053000  
257055000 257056000 257065000 257458000  
DT - Corresponding document  
UP - 2000-10

1 / 1 LEGALI - @LEGSTAT  
PN - US 6028264 [US6028264]  
AP - US 910465/97 19970725 [1997US-0910465]  
DT - US-P  
ACTE- 19970725 US/AE-A  
APPLICATION DATA (PATENT)  
US 910465/97 19970725 [1997US-0910465]  
20000222 US/A  
PATENT  
UP - 2002-10

22 / 24 PLUSPAT - @QUESTEL-ORBIT - image  
PN - US6043105 A 20000328 [US6043105]  
STG - (A) United States patent  
TI - (A) Method for manufacturing semiconductor sensitive devices  
PA - (A) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kangawa-ken [JP]  
IN - (A) YAMAZAKI SHUNPEI (JP)  
IC - (A) H01L-031/18 H01L-031/20  
AP - US93802097 19970912 [1997US-0938020]

PR - US93802097 19970912 [1997US-0938020]  
JP9639185 19850507 [1985JP-0096391]  
JP9639285 19850507 [1985JP-0096392]  
US63438496 19960418 [1996US-0634384]  
US43837495 19950510 [1995US-0438374]  
US35011594 19941129 [1994US-0350115]  
US69440691 19910501 [1991US-0694406]  
US86044186 19860507 [1986US-0860441]  
US80069485 19851122 [1985US-0800694]  
EC - H01L-021/205  
PCL - ORIGINAL (O) : 438058000; CROSS-REFERENCE (X) : 134001100  
257E21101 427534000 427569000 427574000 427579000 427588000  
438096000 438097000  
DT - Basic  
UP - 2000-13

1 / 1 LEGALI - ©LEGSTAT  
PN - US 6043105 [US6043105]  
AP - US 938020/97 19970912 [1997US-0938020]  
DT - US-P  
ACTE- 19970912 US/AE-A  
APPLICATION DATA (PATENT)  
US 938020/97 19970912 [1997US-0938020]  
  
20000328 US/A  
PATENT  
UP - 2000-17

23 / 24 PLUSPAT - ©QUESTEL-ORBIT  
PN - USRE37441 E1 20011113 [USRE37441]  
STG - (E1) Reissue Patent  
TI - (E1) Photoelectric conversion device  
PA - (E1) SEMICONDUCTOR ENERGY LAB (US)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa-ken [JP]  
IN - (E1) YAMAZAKI SHUNPEI (JP)  
IC - (E1) H01L-031/075  
AP - US94773297 19971008 [1997US-0947732]  
PR - US94773297 19971008 [1997US-0947732]  
JP14656182 19820824 [1982JP-0146561]  
JP18254682 19821018 [1982JP-0182546]  
JP22815882 19821223 [1982JP-0228158]  
US56421383 19831222 [1983US-0564213]  
US40849995 19950322 [1995US-0408499]  
US52545983 19830822 [1983US-0525459]  
EC - H01L-031/028B  
H01L-031/0288  
H01L-031/0376B  
H01L-031/0392B  
H01L-031/075  
H01L-031/075C  
PCL - ORIGINAL (O) : 136258000; CROSS-REFERENCE (X) : 136255000  
257053000 257055000 257056000 257458000 257463000  
DT - Corresponding document  
UP - 2001-47

1 / 1 LEGALI - ©LEGSTAT  
PN - US 37441 [USRE37441]

AP - US 947732/97 19971008 [1997US-0947732]  
DT - US-E  
ACTE- 19971008 US/AE-A  
APPLICATION DATA (PATENT)  
US 947732/97 19971008 [1997US-0947732]

20011113 US/E1 [+]  
REISSUE (PRE-GRANT)  
UP - 2001-48

24 / 24 PLUSPAT - @QUESTEL-ORBIT

PN - US6346716 B1 20020212 [US6346716]  
STG - (B1) U.S. Patent (no pre-grant pub.) after Jan. 2, 2001  
TI - (B1) Semiconductor material having particular oxygen concentration  
and semiconductor device comprising the same  
PA - (B1) SEMICONDUCTOR ENERGY LAB (JP)  
PAO - Semiconductor Energy Laboratory Company, Ltd., Kanagawa-ken [JP]  
IN - (B1) YAMAZAKI SHUNPEI (JP)  
IC - (B1) H01L-029/12  
AP - US99434597 19971219 [1997US-0994345]  
PR - US99434597 19971219 [1997US-0994345]  
JP22815882 19821223 [1982JP-0228158]  
US41196795 19950328 [1995US-0411967]  
US35016994 19941130 [1994US-0350169]  
US16553693 19931213 [1993US-0165536]  
US74842191 19910822 [1991US-0748421]  
US44301589 19891129 [1989US-0443015]  
US78558685 19851008 [1985US-0785586]  
US56421393 19931222 [1993US-0564213]  
US52545983 19830822 [1983US-0525459]  
EC - H01L-031/028B  
H01L-031/0288  
H01L-031/0392B  
H01L-031/075  
H01L-031/075C  
PCL - ORIGINAL (O) : 257065000; CROSS-REFERENCE (X) : 257052000  
257053000 257054000 257055000 257056000 257057000 257058000  
257062000 257066000 257067000 257068000 257069000 257070000  
257290000 257293000 257439000 257462000  
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